## SEQUENCE LISTING

<110> University of Florida Research Foundation, Inc. Hannah, L. Curtis Lyerly Linebarger, Carla R. <120> Heat Stable Variants of Adenosine Diphosphate Glucose Pyrophosphorylase <130> UF-371XC1 PCT <150> US 60/496.188 <151> 2003-08-18 <160> 42 <170> PatentIn version 3.2 <210> 1 <211> 1425 <212> DNA <213> zea mays <400> 1 atggacatgg ctttggcgtc taaagcctcc cctccqccat ggaatgccac cgccgccgag 60 cagccaattc caaaqcqtqa caaaqccqct qcaaatqatt caacatacct caatcctcaa 120 geteatgata gtgttettgg aateattetg ggaggtggtg etgggaetag attgtacece 180 ttgacaaaga agcqtgccaa qcctgcaqtg ccattgggtg ccaactatag actgattgat 240 attectgtca gcaattgtet caacagcaac atatecaaga tetatgtget aacgcaattt 300 aactetgett ceetcaaccq teacetetea aqaqeetacq qqaqeaacat tggagggtac 360 aagaatgaag ggtttgttga agtcttagct gcacagcaga gcccagataa tccaaactgg 420 tttcagggta ctgcagatgc tgtaaggcag tacttgtggt tgtttgagga gcataatgtg 480 atggaattte taattettge tggcgateac etgtacegga tggactatga aaagtteatt 540 caggcacaca gagaaacaaa tgctgatatt accgttgctg ccctaccgat ggatqaqaaa 600 cqtqcaactq catttqqcct catqaaaatt qatqaaqaaq gqaqqatcat tgagtttgct 660 qaqaaaccqa aaqqaqaqca gttgaaaqca atgatggttg acaccaccat acttggcctt 720 qatqacqtqa qqqcaaaqqa aatqccttat attgctagca tgggtatcta tgttttcagc 780 aaagatqtaa tqcttcaqct cctccqtqaa caatttcctg aagccaatga ctttggaagt 840 qaqqttattc caqqtqcaac caqcattgga aagagggttc aggcttatct gtatgatggt 900 tactgggaag atatcggtac cattgcggca ttttataatg caaacttggg aataaccaag 960 aagecaatae cagattteag ettetatgae egttttgete caatttatae acaacetega 1020

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Ile Tyr Val Pho		Val Met Leu 265		Arg Glu Gln 270
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Tyr Thr Gln Pro		Pro Pro Ser 345		Asp Ala Asp 350
Val Thr Asp Se: 355	r Val Ile Gly	Glu Gly Cys 360	Val Ile Lys 365	Asn Cys Lys
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Ile Ile Glu Asp 385	Ser Leu Leu 390	Met Gly Ala	Asp Tyr Tyr 395	Glu Thr Glu 400
Ala Asp Lys Ly	Leu Leu Ala 405	Glu Lys Gly 410		Ile Gly Ile 415
Gly Lys Asn Se:		Arg Ala Ile 425		Asn Ala Arg 430
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Asp Ser Glu Thr Cys Leu Asn Pro Gln Ala His Asp Ser Val Leu Gly  $35 \hspace{1cm} 40 \hspace{1cm} 45$ 

Ile Ile Leu Gly Gly Gly Ala Gly Thr Arg Leu Tyr Pro Leu Thr Lys 50 55 60

Lys Arg Ala Lys Pro Ala Val Pro Leu Gly Ala Asn Tyr Arg Leu Ile 65 70 75 80

Asp Ile Pro Val Ser Asn Cys Leu Asn Ser Asn Ile Ser Lys Ile Tyr 85 90 95

Val Leu Thr Gln Phe Asn Ser Ala Ser Leu Asn Arg His Leu Ser Arg  $100 \\ 105 \\ 110$ 

Ala Tyr Gly Ser Asn Ile Gly Gly Tyr Lys Asn Glu Gly Phe Val Glu 115 120 125

Val Leu Ala Ala Gln Gln Ser Pro Asp Asn Pro Asn Trp Phe Gln Gly 130  $$135\$ 

Thr Ala Asp Ala Val Arg Gln Tyr Leu Trp Leu Phe Glu Glu His Asn 145  $\phantom{\bigg|}$  150  $\phantom{\bigg|}$  155  $\phantom{\bigg|}$  160

Val Met Glu Phe Leu Ile Leu Ala Gly Asp His Leu Tyr Arg Met Asp 165 170 175

Tyr Glu Lys Phe Ile Gln Ala His Arg Glu Thr Asn Ala Asp Ile Thr 180 185 190

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tca s																1251
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agg . Arg .																1443
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tac tac ata agg tet gga ate gtg gtg ate etg aag aat gca ace ate Tyr Tyr Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile 495 1576 aac gat ggg tot gtc ata tagategget gegtktgeg Asn Asp Gly Ser Val Ile <210> 16 <211> 516 <212> PRT <213> Zea mays <400> 16 Met Gln Phe Ala Leu Ala Leu Asp Thr Asn Ser Gly Pro His Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 40 Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly 100 Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 120 Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 170 175 Ala Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 200 Leu Ser Gly Asp Gln Leu Tyr Arq Met Asn Tyr Met Glu Leu Val Gln

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Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
Ser	Met	Arg 275	Val	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
Asp 305	Ala	Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315	Thr	Gln	Leu	His	Asp 320
Phe	Gly	Ser	Glu	11e 325	Leu	Pro	Arg	Ala	Val 330	Leu	Asp	Tyr	Ser	Val 335	Gln
Ala	Cys	Ile	Phe 340	Thr	Gly	Tyr	Trp	Glu 345	Asp	Val	Gly	Thr	Ile 350	Lys	Ser
Phe	Phe	Asp 355	Ala	Asn	Leu	Ala	Leu 360	Thr	Glu	Gln	Pro	Ser 365	Lys	Phe	Asp
Phe	Tyr 370	Asp	Pro	Lys	Thr	Pro 375	Phe	Phe	Thr	Ala	Pro 380	Arg	Cys	Leu	Pro
Pro 385	Thr	Gln	Leu	Asp	Lys 390	Cys	Lys	Met	Lys	Tyr 395	Ala	Phe	Ile	Ser	Asp 400
Gly	Cys	Leu	Leu	Arg 405	Glu	Cys	Asn	Ile	Glu 410	His	Ser	Val	Ile	Gly 415	Val
Cys	Ser	Arg	Val 420	Ser	Ser	Gly	Cys	Glu 425	Leu	Lys	Asp	Ser	Val 430	Met	Met
Gly	Ala	Asp 435	Ile	Tyr	Glu	Thr	Glu 440	Glu	Glu	Ala	Ser	Lys 445	Leu	Leu	Leu
Ala	Gly 450	Lys	Val	Pro	Val	Gly 455	Ile	Gly	Arg	Asn	Thr 460	Lys	Ile	Arg	Asn
Cys 465	Ile	Ile	Asp	Met	Asn 470	Ala	Arg	Ile	Gly	Lys 475	Asn	Val	Val	Ile	Thr 480
Asn	Ser	Lys	Gly	Ile 485	Gln	Glu	Ala	Asp	His 490	Pro	Glu	Glu	Gly	Tyr 495	Tyr
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Ala	Asp 80	Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	
		ctc Leu														339
		gga Gly														387
		ggt Gly														435
		aac Asn 145														483
		gat Asp														531
		ccn Pro														579
		gta Val														627
		ttg Leu														675
		aaa Lys 225														723
		gat Asp														771
		gga Gly														819
ttg																867

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			gga Gly													1011
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			tac Tyr 370													1155
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			agt Ser													1491
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Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 40 45

Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 60

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp 65 75 80

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln 85 90 95

Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly 100 105 110

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 120 125

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 \$150\$

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175

Pro Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp 180 185 190

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195 200 205

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 215 220

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 235 240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr

510

245 250 255 Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn 270 Ser Met Arq Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 280 Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys 295 Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp His Ser Val Gln 325 Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser 350 Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp 360 Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 375 Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp 385 Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met 425 430 Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu 440 Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn 455 Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr 465 Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr 490 Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile Asn Asp

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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
15
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
                                                                   195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
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tqt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
Cvs Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
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gct	gat	gca	aac	cgt	gta	tct	gck	atc	att	ttg	ggc	gga	ggc	act	gga	291
Ala	Asp 80	Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	
									aga Arg							339
									atc Ile 120							387
									atg Met							435
									tac Tyr							483
									gcg Ala							531
									gca Ala							579
									cac His 200							627
									cgg Arg							675
									gat Asp							723
									aat Asn							771
									gaa Glu							819
									ttc Phe 280							867
gat	gca	cag	a <b>a</b> a	tat	cca	tac	ctt	gca	tca	atg	ggc	att	tat	gtc	ttc	915

Asp	Ala	Gln	Lys 2 <b>9</b> 0	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	
				ctt Leu												963
				tct Ser												1011
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aaa Lys	tca Ser	ttc Phe	ttt Phe	gat Asp 355	gca Ala	aac Asn	ttg Leu	gcc Ala	ctc Leu 360	act Thr	gag Glu	cag Gln	cct Pro	tcc Ser 365	aag Lys	1107
				gat Asp												1155
				caa Gln												1203
tca Ser	cay His 400	ggt Gly	tgc Cys	tta Leu	ctg Leu	aga Arg 405	gaa Glu	tgc Cys	aac Asn	atc Ile	gag Glu 410	cat His	tct Ser	gtg Val	att Ile	1251
				cgt Arg												1299
atg	atg	gga	gcg	gac	atc	tat	gaa	act	gaa	gaa	gaa	gct	tca	aag	cta	1347
Met	Met	Gly	Ala	Asp 435	Ile	Tyr	Glu	Thr	Glu 440	Glu	Glu	Ala	Ser	Lys 445	Leu	
				aag Lys												1395
				att Ile												1443
				aag Lys												1491
tac Tyr 495	tac Tyr	ata Ile	agg Arg	tct Ser	gga Gly 500	atc Ile	gtg Val	gtg Val	atc Ile	ctg Leu 505	aag Lys	aat Asn	gca Ala	acc Thr	atc Ile 510	1539
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Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 40 45

Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro  $50 \hspace{1cm} 55 \hspace{1cm} 60 \hspace{1cm}$ 

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp 65 70 75 80

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln  $85 \hspace{1.5cm} 90 \hspace{1.5cm} 95$ 

Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly 100  $$105\$ 

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 120 125

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145  $\,$  150  $\,$  155  $\,$  160

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175

Ala Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp
180 185 190

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195 200 205

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 215 220

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 235 240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr

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Gly Arg Val Leu 260		Glu Lys Pro 265	Lys Gly Ala	Asp Leu Asn 270
Ser Met Arg Val 275	Glu Thr Asn	Phe Leu Ser 280	Tyr Ala Ile 285	Asp Asp Ala
Gln Lys Tyr Pro 290	Tyr Leu Ala 295	Ser Met Gly	Ile Tyr Val 300	Phe Lys Lys
Asp Ala Leu Leu 305	Asp Leu Leu 310	Lys Ser Lys	Tyr Thr Gln 315	Leu His Asp 320
Phe Gly Ser Glu	Ile Leu Pro 325	Arg Ala Val 330	Leu Asp His	Ser Val Gln 335
Ala Cys Ile Phe 340		Trp Glu Asp 345	Val Gly Thr	Ile Lys Ser 350
Phe Phe Asp Ala 355	Asn Leu Ala	Leu Thr Glu 360	Gln Pro Ser 365	Lys Phe Asp
Phe Tyr Asp Pro	Lys Thr Pro 375	Phe Phe Thr	Ala Pro Arg 380	Cys Leu Pro
Pro Thr Gln Leu 385	Asp Lys Cys 390	Lys Met Lys	Tyr Ala Phe 395	Ile Ser His 400
Gly Cys Leu Leu	Arg Glu Cys 405	Asn Ile Glu 410	His Ser Val	Ile Gly Val 415
Cys Ser Arg Val		Cys Glu Leu 425	Lys Asp Ser	Val Met Met 430
Gly Ala Asp Ile 435	Tyr Glu Thr	Glu Glu Glu 440	Ala Ser Lys 445	Leu Leu Leu
Ala Gly Lys Val 450	Pro Ile Gly 455	Ile Gly Arg	Asn Thr Lys 460	Ile Arg Asn
Cys Ile Ile Asp 465	Met Asn Ala 470	Arg Ile Gly	Lys Asn Val 475	Val Ile Thr 480
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
                                                                     147
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
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                                                            45
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
                                                                     195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
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                                  55
                                                       60
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Cvs Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
                              70
get gat gca aac cgt gta tet gck atc att ttg ggc gga ggc act gga
                                                                     291
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
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gag c Glu F 175										579
atc t Ile T										627
gta a Val I										675
gtg c Val G										723
ect g Pro V 2										771
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gat g Asp A										915
aag a Lys L										963

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Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 60

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp 65 70 75 80

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln  $85 \hspace{1.5cm} 90 \hspace{1.5cm} 95$ 

Leu Phe Pro Leu Thr Ser Thr Thr Ala Thr Pro Ala Val Pro Val Gly

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 120 125

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 150 160

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro \$165\$

Ala Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp 180 185 190

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195 200 205

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 215 220

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 235 240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr \$245\$ \$250\$

Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn 260 265 270

Ser Met Arg Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 275 280 285

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Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser
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Cys Ser Arq Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met
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Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn
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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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                                          25
aqt att qqq qqc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
                                                                    147
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                    243
Cvs Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
                                                                    291
gct gat gca aac cgt gta tot gck atc att ttg ggc gga ggc act gga
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
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tet eag ete tit eet etg aca age aca aga get aeg eet get gta eet
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
95
                    100
                                         105
                                                             110
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Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
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					cat His												483
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a I	tc le	tgg Trp	gta Val	ctc Leu	gag Glu 195	gat Asp	tat Tyr	tac Tyr	agt Ser	cac His 200	aaa Lys	tcc Ser	att Ile	gac Asp	aac Asn 205	att Ile	627
					ggc Gly												675
g V	tg al	cag Gln	aaa Lys 225	cat His	gtc Val	gag Glu	gac Asp	gat Asp 230	gct Ala	gat Asp	atc Ile	act Thr	ata Ile 235	tca Ser	tgt Cys	gct Ala	723
					agc Ser												771
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					aga Arg 275												867
					tat Tyr												915
					ctt Leu												963
					tct Ser												1011
V					att Ile												1059

aaa tca tto ttt gat gca aac ttg gcc ctc act gag cag cct tcc aag Lys Ser Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys 355 360 365	1107
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ttg cct ccg acg caa ttg gac aag tgc aag atg aaa tat gca ttt atc Leu Pro Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile 385 390 395	1203
tca gat ggt tgc tta ctg aga gaa tgc aac atc gag cat tct gtg att Ser Asp Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile 400 405 410	1251
gga gtc tgc tca cgt gtc agc tct gga tgt gaa ctc aag gac tcc gtg Gly Val Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val $425$ 420 425	1299
atg atg gga gcg gac atc tat gaa act gaa gaa gaa gct tca aag cta Met Met Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu $$435$$	1347
ctg tta gct ggg aag gtc ccr gtt gga ata gga agg aac ath aag ata Leu Leu Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Ile Lys Ile 450 $$450$$	1395
agg aac tgt atc att gac atg aat gct agg att ggg aag aac gtg gtg arg Asn Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val 465 $470 \hspace{1cm} 475$	1443
atc aca aac agt aag ggc atc caa gag gct gat cac ccg gaa gaa ggg Ile Thr Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly 480 490	1491
tac tac ata agg tct gga atc gtg gtg atc ctg aag aat gca acc atc Tyr Tyr Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile 495 500 505 510	1539
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Arg	Val 50	Ala	Ala	Thr	Thr	Gln 55	Cys	Ile	Leu	Thr	Ser 60	Asp	Ala	Cys	Pro
Glu 65	Thr	Leu	His	Ser	Gln 70	Thr	Gln	Ser	Ser	Arg 75	Lys	Asn	Tyr	Ala	Asp 80
Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	Ser 95	Gln
Leu	Phe	Pro	Leu 100	Thr	Ser	Thr	Arg	Ala 105	Thr	Pro	Ala	Val	Pro 110	Val	Gly
Gly	Cys	Tyr 115	Arg	Leu	Ile	Asp	Ile 120	Pro	Met	Ser	Asn	Cys 125	Phe	Asn	Ser
Gly	Ile 130	Asn	Lys	Ile	Phe	Val 135	Met	Ser	Gln	Phe	Asn 140	Ser	Thr	Ser	Leu
Asn 145	Arg	His	Ile	His	Arg 150	Thr	Tyr	Leu	Glu	Gly 155	Gly	Ile	Asn	Phe	Ala 160
Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Ala	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
Leu	Ser 210	Gly	Asp	Gln	Leu	Tyr 215	Arg	Met	Asn	Tyr	Met 220	Glu	Leu	Val	Gln
Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
Ser	Met	Arg 275	Val	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
Asp 305	Ala	Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315	Thr	Gln	Leu	His	Asp 320
Phe	Glv	Ser	Glu	Ile	Leu	Pro	Arq	Ala	Val	Leu	Asp	Tvr	Ser	Val	Glr

325 330 335 Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser 345 Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp 360 Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 375 Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp 390 395 Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val 410 Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu 440 Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Ile Lys Ile Arg Asn Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr 465 Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr 490 Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile Asn Asp 505 Gly Ser Val Ile 515 <210> 25 <211> 1576 <212> DNA <213> Zea mays <220> <221> CDS <222> (10)..(1563) <223> Shrunken-2 gene revertant form, modified to be heat stable <220> <221> variation <222> (267) <223> k = g or t; amino acid 86 = Ala.

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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
15
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
                                                                   147
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
qqt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                   243
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
get gat gea aac egt gta tet gek ate att ttg gge gga gge act gga
                                                                   291
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
tot cag ctc ttt cct ctg aca agc aca aga gct acg cct gct gta cct
                                                                   339
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
gtt gga gga tgt tac agg ctt att gat atc cct atg agt aac tgc ttc
                                                                   387
Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
                                    120
aac agt ggt ata aat aag ata ttt gtg atg agt cag ttc aat tct act
                                                                   435
Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
            130
                                1.35
teg ett aac ege cat att cat egt aca tac ett gaa gge ggg atc aac
Ser Leu Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn
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	145			150			155		
						gct Ala			531
						gac Asp 185			579
						aaa Lys			627
						atg Met			675
						atc Ile			723
						Gly ggg			771
						aaa Lys 265			819
						ctg Leu			867
						atg Met			915
						tca Ser			963
						gct Ala			1011
						gag Glu 345			1059
		Phe			Āla	act Thr			1107

360

ttt gat ttt tac gat cca aaa aca cct ttc ttc act gca ccc cga tgc 1155 Phe Asp Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys

365

355

370	375	3	380
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ctg tta gct ggg aag Leu Leu Ala Gly Lys 450		Ile Gly Arg Asn ?	
agg aac tgt atc att Arg Asn Cys Ile Ile 465			
atc aca aac agt aag Ile Thr Asn Ser Lys 480			
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Arg Val Ala Ala Thr 50	Thr Gln Cys Ile 55	Leu Thr Ser Asp 7	Ala Cys Pro

Glu 65	Thr	Leu	His	Ser	Gln 70	Thr	Gln	Ser	Ser	Arg 75	Lys	Asn	Tyr	Ala	Asp 80
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Leu	Phe	Pro	Leu 100	Thr	ser	Thr	Arg	Ala 105	Thr	Pro	Ala	Val	Pro 110	Val	Gly
Gly	Cys	Tyr 115	Arg	Leu	Ile	Asp	Ile 120	Pro	Met	Ser	Asn	Cys 125	Phe	Asn	Ser
Gly	Ile 130	Asn	Lys	Ile	Phe	Val 135	Met	Ser	Gln	Phe	Asn 140	Ser	Thr	Ser	Leu
Asn 145	Arg	His	Ile	His	Arg 150	Thr	Tyr	Leu	Glu	Gly 155	Gly	Ile	Asn	Phe	Ala 160
Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Ala	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
Leu	Ser 210	Gly	Asp	Gln	Leu	Tyr 215	Pro	Met	Asn	Tyr	Met 220	Glu	Leu	Val	Gln
Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	11e 235	Ser	Cys	Ala	Pro	Val 240
Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
Ser	Met	Arg 275	Val	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	11e 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
Asp 305	Ala	Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315	Thr	Gln	Leu	His	Asp 320
Phe	Gly	Ser	Glu	11e 325	Leu	Pro	Arg	Ala	Val 330	Leu	Asp	Tyr	Ser	Val 335	Gln
Ala	Cys	Ile	Phe 340	Thr	Gly	Tyr	Trp	Glu 345	Asp	Val	Gly	Thr	Ile 350	Lys	Ser
Phe	Phe	Asp 355	Ala	Asn	Leu	Ala	Leu 360	Thr	Glu	Gln	Pro	Ser 365	Lys	Phe	Asp

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Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp
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Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val
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Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met
Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu
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                            440
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Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn
Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
                                                                   195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                   243
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
get gat gea aac egt gta tet gek ate att ttg gge gga gge act gga
                                                                   291
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
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tet cag etc ttt cet etg aca age aca aga get acg eet get gta eet
                                                                   339
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
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Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
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                                                                   435
Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
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Phe					gta Val											531
					ttc Phe 180											579
					gat Asp											627
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					gag Glu											723
					cga Arg											771
					ctt Leu 260											819
					gtt Val											867
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Leu Pro Pro Thr		Asp Lys Cys		tat gca ttt atc Tyr Ala Phe Ile	1203
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	Leu Leu A			cat tct gtg att His Ser Val Ile	1251
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	Lys Gly 1			ccg gaa gaa ggg Pro Glu Glu Gly	1491
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Glu Thr Leu His	Ser Gln	Thr Gln Ser	Ser Arg Lys	Asn Tyr Ala Asp	

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Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Val	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
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Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
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Ser	Met	Arg 275	Val	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
Asp	Ala	Leu	Leu	Asp	Leu	Leu	Lys	Ser	Lys	Tyr	Thr	Gln	Leu	His	Asp

Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser \$340\$

Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp His Ser Val Gln

330

335

Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp \$355\$

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310

325

305

380

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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tqt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
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                             70
qct qat qca aac cqt qta tct qck atc att ttg ggc gga ggc act gga
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
     80
tot cag ctc ttt cct ctg aca agc aca aga gct acg cct gct gta cct
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
95
                    100
                                                             110
gtt gga gga tgt tac agg ctt att gat atc cct atg agt aac tgc ttc
                                                                   387
Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
                                    120
                115
aac agt ggt ata aat aag ata ttt gtg atg agt cag ttc aat tct act
Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
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                                135
teg ett aac ege cat att eat egt aca tac ett gaa gge ggg atc aac
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Ser	Leu	Asn 145	Arg	His	Ile	His	Arg 150	Thr	Tyr	Leu	Glu	Gly 155	Gly	Ile	Asn	
					gta Val											531
					ttc Phe 180											579
					gat Asp											627
					gat Asp											675
					gag Glu											723
					cga Arg											771
					ctt Leu 260											819
					gtt Val											867
					cca Pro											915
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		n Glu Ala Asp	cac ccg gaa gaa His Pro Glu Glu 490	
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Gly Gly Arg Lys		a Leu Arg Asn . 0	Arg Cys Phe Gly 45	Gly
Arg Val Ala Ala 50	Thr Thr Gln Cy 55	s Ile Leu Thr	Ser Asp Ala Cys 60	Pro

Glu 65	Thr	Leu	His	Ser	Gln 70	Thr	Gln	Ser	Ser	Arg 75	Lys	Asn	Tyr	Ala	Asp 80
Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	Ser 95	Gln
Leu	Phe	Pro	Leu 100	Thr	Ser	Thr	Arg	Ala 105	Thr	Pro	Ala	Val	Pro 110	Val	Gly
Gly	Cys	Tyr 115	Arg	Leu	Ile	Asp	Ile 120	Pro	Met	Ser	Asn	Cys 125	Phe	Asn	ser
Gly	Ile 130	Asn	Lys	Ile	Phe	Val 135	Met	Ser	Gln	Phe	Asn 140	Ser	Thr	ser	Leu
Asn 145	Arg	His	Ile	His	Arg 150	Thr	Tyr	Leu	Glu	Gly 155	Gly	Ile	Asn	Phe	Ala 160
Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Ala	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
Leu	Ser 210	Gly	Asp	Gln	Leu	Tyr 215	Arg	Met	Asn	Tyr	Met 220	Glu	Leu	Val	Gln
Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
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Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
Asp 305	Ala	Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315	Thr	Gln	Leu	His	Asp 320
Phe	Gly	Ser	Lys	Ile 325	Leu	Pro	Arg	Ala	Val 330	Leu	Asp	His	Ser	Val 335	Gln
Ala	Cys	Ile	Phe 340	Thr	Gly	Tyr	Trp	Glu 345	Asp	Val	Gly	Thr	Ile 350	Lys	Ser
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Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Val Phe Ile Ser Asp
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Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val
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Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met
                                 425
Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu
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                            440
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Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn
Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr
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Gly Ser Val Ile
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<222> (267)
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<223> V = C \text{ or } t.
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cct gtt gat gag ago Pro Val Asp Glu Ser 240			
cat act gga cgt gta His Thr Gly Arg Val 255			
ttg aat tct atg aga Leu Asn Ser Met Arg 275	y Val Glu Thr As		
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cat gac ttt gga tct His Asp Phe Gly Ser 320			
gtg cag gca tgc att Val Gln Ala Cys Ile 335			
aaa toa tto ttt gat Lys Ser Phe Phe Asp 355	Ala Asn Leu Al		
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tca gat ggt tgc tta Ser Asp Gly Cys Let 400			
gga gtc tgc tca cgt Gly Val Cys Ser Arg 415			

atg atg gga gcg Met Met Gly Ala			Thr							1347
ctg tta gct ggg Leu Leu Ala Gly 450										1395
agg aac tgt atc Arg Asn Cys Ile 465			Ala.							1443
atc aca aac agt Ile Thr Asn Ser 480										1491
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Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 150 Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 Ala Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 200 Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr 245 250 Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn Ser Met Arg Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys 290 295 300 Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp 305 310 Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp Phe Ser Val Gln 330 Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 370 375 380 Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp 385 390 Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val

410

430

Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met

425

420

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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
                    470
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Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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				ata Ile						435
				cat His						483
				cag Gln 165						531
				cag Gln						579
				tat Tyr						627
				cag Gln						675
				gac Asp						723
				gct Ala 245						771

					caa Gln										819
					gag Glu										867
					tac Tyr										915
					gac Asp										963
					atc Ile 325										1011
					acg Thr										1059
					aac Asn										1107
					aaa Lys										1155
					gac Asp										1203
					aga Arg 405										1251
					agc Ser										1299
atg	gga				tat										1347
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Lys His 7 225	Val Glu	Asp Asp 230		Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
Asp Glu	Ser Arg	Ala Ser 245	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly Arg	Val Leu 260	Gln Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
Ser Met i	Arg Val 275	Glu Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln Lys 1 290	Tyr Pro	Tyr Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
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Pro Thr 0	Gln Leu	Asp Lys		Lys	Met	Lys	Tyr 395	Ala	Phe	Ile	Ser	Asp 400
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Cys Ile : 465	Ile Asp	Met Asr 470		Arg	Ile	Gly	Lys 475	Asn	Val	Val	Ile	Thr 480
Asn Ser	Lys Gly	Ile Glr 485	Glu	Ala	Asp	His 490	Pro	Glu	Glu	Gly	Tyr 495	Tyr
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<221> variation
<222> (540)
<223> n = a or g or c or t/u, unknown, or other.
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<223> y = c or t.
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
                 35
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Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
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60

74 UF.371XC1

5.5

50

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	gat Asp 80															291
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gtt Val	gga Gly	gga Gly	tgt Cys	tac Tyr 115	agg Arg	ctt Leu	att Ile	gat Asp	atc Ile 120	cct Pro	atg Met	agt Ser	aac Asn	tgc Cys 125	ttc Phe	387
aac Asr	agt Ser	ggt Gly	ata Ile 130	aat Asn	aag Lys	ata Ile	ttt Phe	gtg Val 135	atg Met	agt Ser	cag Gln	ttc Phe	aat Asn 140	tct Ser	act Thr	435
	ctt Leu															483
Phe	gct Ala 160	gat Asp	gga Gly	tct Ser	gta Val	cag Gln 165	gta Val	tta Leu	gcg Ala	gct Ala	aca Thr 170	caa Gln	atg Met	cct Pro	gaa Glu	531
gaç Glu 175	cca Pro	gtn Val	gga Gly	tgg Trp	ttc Phe 180	cag Gln	ggt Gly	aca Thr	gca Ala	gac Asp 185	tct Ser	atc Ile	aga Arg	aaa Lys	ttt Phe 190	579
	tgg Trp															627
	atc   Ile															675
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	gtt Val 240															771
	act Thr															819
	aat 1 Asn															867

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		a ctt tta a Leu Leu		ı Leu								963
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		att ttt Ile Phe 340	Thr Gly									1059
		gat gca Asp Ala 355										1107
		gat cca Asp Pro										1155
		g caa ttg r Gln Leu		Cys								1203
tca gar Ser Asp 40	Gly Cy	tta ctg Leu Leu	aga gaa Arg Gl	a tgc ı Cys	aac Asn	atc Ile	gag Glu 410	cat His	tct Ser	gtg Val	att Ile	1251
		a cgt gtc r Arg Val 420	Ser Se									1299
		g gac ato a Asp Ile 435										1347
ctg tta Leu Le	gct gg Ala Gl 45	g aag gto / Lys Val	eer gt	gga 1 Gly 455	ata Ile	gga Gly	agg Arg	aac Asn	aca Thr 460	aag Lys	ata Ile	1395
		c att gac e Ile Asp		ı Ala								1443
	Asn Se	aag ggc r Lys Gly										1491
		g tot gga g Ser Gly 500	Ile Va									1539

aac gat ggg tot gto ata tagatoggot gogtktgog 1576

Asn Asp Gly Ser Val Ile 515

<210> 36 <211> 516

<212> PRT <213> Zea mays

<400> 36

Met Gln Phe Ala Leu Ala Leu Asp Thr Asn Ser Gly Pro His Gln Ile 1 5 10 15

Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu Ser Ile
20 25 30

Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 40 45

Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 60

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp 65 70 75 80

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln \$85\$ 90 95

Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly 100 105 110

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 120 125

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175

Val Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp 180 185 190

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195 200 205

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 215 220

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 235 240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn Ser Met Arg Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 280 275 Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys 295 Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp 310 305 Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp Tyr Ser Val Gln 330 Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp 355 360 Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 375 Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp 385 390 Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val 410 Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu 435 440 Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr 465 Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr 490 Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile Asn Asp 505 Glv Ser Val Ile

<210> 37

515

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<211> 1576
<212> DNA
<213> Zea mays
<220>
<221> CDS
<222> (10)..(1563)
<223> Shrunken-2 gene revertant form, modified to be
      heat stable
<220>
<221> variation
<222> (267)
<223> k = g or t; amino acid 86 = Ala.
<220>
<221> variation
<222> (1008)
<223> y = c or t.
<220>
<221> variation
<222> (1197)
<223> n = a or g or c or t/u, unknown, or other.
<220×
<221> variation
<222> (1368)
<223> r = a or g: amino acid 453 = Pro.
<220>
<221> variation
<222> (1578)
<223> k = q or t.
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          Met Gln Phe Ala Leu Ala Leu Asp Thr Asn Ser Gly Pro His
cag ata aga tot tgt gag ggt gat ggg att gac agg ttg gaa aaa tta
Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
 15
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
Ser Ile Gly Gly Arq Lys Gln Glu Lys Ala Leu Arq Asn Arq Cys Phe
                 35
                                                          45
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
Gly Gly Arq Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
             50
tgt cet gaa act ett cat tet caa aca cag tee tet agg aaa aat tat
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
                             70
get gat gea aac egt gta tet gek ate att tig gge gga gge act gga
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Ala	Asp 80	Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	
	cag Gln															339
	gga Gly															387
	agt Ser															435
tcg Ser	ctt Leu	aac Asn 145	cgc Arg	cat His	att Ile	cat His	cgt Arg 150	aca Thr	tac Tyr	ctt Leu	gaa Glu	ggc Gly 155	ggg Gly	atc Ile	aac Asn	483
	gct Ala 160															531
	cca Pro															579
	tgg Trp															627
	atc Ile															675
	cag Gln															723
	gtt Val 240															771
	act Thr															819
	aat Asn															867
	gca Ala															915
aag	aaa	gat	gca	ctt	tta	gac	ctt	ctc	aag	tca	aaa	tat	act	caa	tta	963

Lys	Lys	Asp 305	Ala	Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315	Thr	Gln	Leu	
	gac Asp 320															1011
	cag Gln															1059
	tca Ser															1107
	gat Asp															1155
	cct Pro															1203
	gat Asp 400															1251
	gtc Val															1299
	atg Met															1347
	tta Leu															1395
	aac Asn															1443
	aca Thr 480															1491
tac Tyr 495	tac Tyr	ata Ile	agg Arg	tct Ser	gga Gly 500	atc Ile	gtg Val	gtg Val	atc Ile	ctg Leu 505	aag Lys	aat Asn	gca Ala	acc Thr	atc Ile 510	1539
	gat Asp					taga	atcgg	get	gegt)	ctgc	3					1576

<210> 38

<211> 516

<212> PRT <213> Zea mays

<400> 38

Met Gln Phe Ala Leu Ala Leu Asp Thr Asn Ser Gly Pro His Gln Ile 1  $\phantom{\bigg|}$  5  $\phantom{\bigg|}$  10  $\phantom{\bigg|}$  15

Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu Ser Ile  $20 \\ 25 \\ 30$ 

Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 40 45

Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 55 60

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp  $65 \hspace{1.5cm} 70 \hspace{1.5cm} 75 \hspace{1.5cm} 80$ 

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln  $85 \phantom{\bigg|}90\phantom{\bigg|}95\phantom{\bigg|}$ 

Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly  $100 \,$   $105 \,$   $110 \,$ 

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 120 125

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 150 150 160

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175

Ala Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp 180 185 190

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195 200 205

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 215 220

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 235 240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr

Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn 260 265 270

Ser Met Arg Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 275 280 285

Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys 290 295 300

Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp 305  $\phantom{\bigg|}$  310  $\phantom{\bigg|}$  315  $\phantom{\bigg|}$  320

Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp Tyr Ser Val Gln 325 330 335

Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp 355 360 365

Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 370 375 380

Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Val Phe Ile Ser Asp 385 390 395 400

Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met 420 425 430

Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu 435 440 445

Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn 450 \$450\$

Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr 465 \$470\$

Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr 485 \$490\$

Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile Asn Asp 500 505 510

Gly Ser Val Ile 515

<210> 39

<211> 1576 <212> DNA

<213> Zea mays

<220>

<221> CDS

<222> (10)..(1563)

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<223> Shrunken-2 gene revertant form, modified to be
      heat stable
<220>
<221> variation
<222> (267)
<223> k = q or t; amino acid 86 = Ala.
<220>
<221> variation
<222> (540)
<223> n = a or g or c or t/u, unknown, or other.
<221> variation
<222> (1008)
<223> y = c \text{ or t.}
<220>
<221> variation
<222> (1197)
<223> n = a or g or c or t/u, unknown, or other.
<220>
<221> variation
<222> (1368)
<223> r = a or g; amino acid 453 = Pro.
<220>
<221> variation
<222> (1578)
<223> k = q or t.
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cag ata aga tot tgt gag ggt gat ggg att gac agg ttg gaa aaa tta
Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
 15
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
                                                                   147
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
Gly Gly Arq Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                   243
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
get gat gea aac egt gta tet gek ate att tig gge gga gge act gga
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
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cag Gln								339
gga Gly								387
agt Ser								435
ctt Leu								483
gct Ala 160								531
cca Pro								579
tgg Trp								627
atc Ile								675
cag Gln								723
gtt Val 240								771
act Thr								819
aat Asn								867
gca Ala								915
aaa Lys								963

			gaa Glu									1011
v			ttt Phe 340									1059
			gca Ala									1107
			cca Pro									1155
			ttg Leu									1203
			ctg Leu									1251
G			gtc Val 420									1299
			atc Ile									1347
			gtc Val									1395
			gac Asp									1443
			ggc Gly									1491
Т			gga Gly 500									1539
	gat Asp		ata Ile	taga	tcg	get g	gegtl	ctgc	Ŧ			1576

<sup>&</sup>lt;210> 40

<sup>&</sup>lt;211> 516

<sup>&</sup>lt;212> PRT

<sup>&</sup>lt;213> Zea mays

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Met Gln Phe Ala Leu Ala Leu Asp Thr Asn Ser Gly Pro His Gln Ile  $1 \hspace{1.5cm} 5 \hspace{1.5cm} 10 \hspace{1.5cm} 15$ 

Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu Ser Ile \$20\$

Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 \$40\$

35 40 45

Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp 65 70 75 80

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln  $85 \hspace{1cm} 90 \hspace{1cm} 95$ 

Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly  $100 \ \ \, 105 \ \ \, 110$ 

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 \$120\$

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 150 155 160

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175

Val Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp  $180 \,$   $185 \,$   $190 \,$ 

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195 200 205

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 \$215\$

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225 230 235 240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr \$245\$

Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn 260 265 270

Ser Met Arg Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 275 280 285

Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys

290 295 300 Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp 310 Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp His Ser Val Gln Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser 345 Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 375 Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Val Phe Ile Ser Asp 390 395 Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val 410 Cys Ser Arq Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met 425 Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu 435 Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn Cvs Ile Ile Asp Met Asn Ala Arq Ile Gly Lys Asn Val Val Ile Thr 470 475 Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile Asn Asp 505 Gly Ser Val Ile 515 <210> 41 <211> 1576 <212> DNA <213> Zea mays <220> <221> CDS <222> (10)..(1563) <223> Shrunken-2 gene revertant form, modified to be heat stable

<220>

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<221> variation
<222> (267)
<223> k = g or t; amino acid 86 = Ala.
<2205
<221> variation
<222> (540)
<223> n = a or g or c or t/u, unknown, or other.
<220>
<221> variation
<222> (1008)
<223> v = c \text{ or t.}
<220>
<221> variation
<222> (1197)
<223> n = a or g or c or t/u, unknown, or other.
<220>
<221> variation
<222> (1368)
\langle 223 \rangle r = a or q; amino acid 453 = Pro.
<220×
<221> variation
<222> (1578)
<223> k = g or t.
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caq ata aga tot tgt gag ggt gat ggg att gac agg ttg gaa aaa tta
Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
15
                     20
agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
                 35
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
             50
                                  55
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
Cvs Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
get gat gea aac egt gta tet gek ate att ttg gge gga gge aet gga
                                                                    291
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
                         85
tet caq ete ttt eet etq aca aqe aca aqa qet acq eet qet qta eet
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
                    100
                                         105
                                                             110
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gga Gly								387
agt Ser								435
ctt Leu								483
gct Ala 160								531
cca Pro								579
tgg Trp								627
atc Ile								675
cag Gln								723
gtt Val 240								771
act Thr								819
aat Asn								867
gca Ala								915
aaa Lys								963
gac Asp 320								1011

gtg cas Val Gl: 335											1059
aaa to Lys Se		Ala									1107
ttt ga Phe As	Phe T										1155
ttg cc Leu Pr											1203
tca ga Ser Asj 40	Gly										1251
gga gt Gly Va 415											1299
atg at Met Me		Ile									1347
ctg tt	ı Ala G										1395
agg aa Arg As											1443
atc ac Ile Th 48	Asn S										1491
tac ta Tyr Ty 495											1539
aac ga Asn As		Ile	taga	ateg	get s	gegtl	stge	3			1576

<210> 42 <211> 516

<211> 516 <212> PRT

<213> Zea mays

<400> 42

Met Gln Phe Ala Leu Ala Leu Asp Thr Asn Ser Gly Pro His Gln Ile

Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu Ser Ile 20 25 30

Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 \$40\$

Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 60

Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp 65 70 75 80

Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln  $85 \hspace{1cm} 90 \hspace{1cm} 95$ 

Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly
100 105 110

Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 \$120\$

Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 135 140

Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175

Val Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp \$180\$ 185 190

Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 195  $\phantom{\bigg|}200\phantom{\bigg|}$ 

Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln 210 215 220

Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 225  $\phantom{\bigg|}$  230  $\phantom{\bigg|}$  235  $\phantom{\bigg|}$  240

Asp Glu Ser Arg Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr \$245\$

Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn  $260 \hspace{1cm} 265 \hspace{1cm} 270 \hspace{1cm}$ 

Ser Met Arg Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 275 280 285

Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys 290 295 300

Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp 305 310 315 320

Phe Gly Ser Glu Ile Leu Pro Arg Ala Val Leu Asp Tyr Ser Val Gln

Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser 340 345 350

Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp 355 360 365

Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 370 380

Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Val Phe Ile Ser Asp 385 390 395 400

Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val 405 410 415

Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met 420 \$425\$

Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu 435 \$440\$

Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn  $450 \\ \hspace*{1.5cm} 455 \\ \hspace*{1.5cm} 460 \\ \hspace*{1.5cm}$ 

Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr 465 \$470\$

Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr 485 490 495

Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile Asn Asp  $500 \hspace{1.5cm} 505 \hspace{1.5cm} 510 \hspace{1.5cm}$ 

Gly Ser Val Ile 515